# Residential Fire Sprinklers
# Introduction to NFPA 13D Standard


# Speaker

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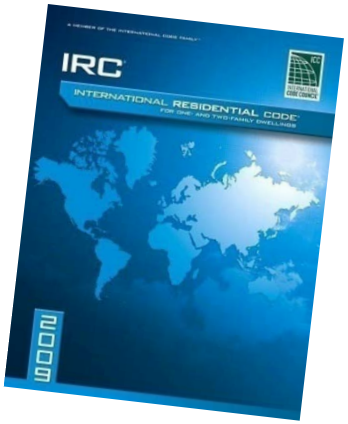
# Residential Fire Sprinkler Mandate

- 2009 International Residential Code
- Requires sprinklers in every new 1-2 family home on JAN 1, 2011
- New $3B opportunity
- Each state still needs to adopt code
- Industry will need 7,000 new installers
- Huge opportunity for qualified plumbers

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# Residential Sprinkler Market

- Defined by National Fire Protection Association (NFPA) 13D sprinkler standard
- Limited to 1 and 2 family homes
- System types
  - "Stand-alone" system: separate from plumbing
  - "Multipurpose" systems: integrated with the home's potable cold-water plumbing
- Purpose: control fire for 10 minutes, allowing egress

# NFPA 13D

- Installation standard for residential sprinklers
- It's established, it works
- Contents
  - General Requirements
  - System components
  - Water supply
  - Installation
  - System design


- Local AHJ (Authority Having Jurisdiction) has final say

# NFPA 13D

- Chapter 1 – Administration
- Chapter 2 – Referenced Standards
- Chapter 3 – Definitions
- Chapter 4 – General Requirements
- Chapter 5 – System Components
- Chapter 6 – Water Supply
- Chapter 7 – Installation
- Chapter 8 – System Design
- Annexes – Explanatory Material & Informational References

# NFPA 13D Chapter 1

- Scope
- Purpose
- Retroactivity
- Equivalency

# NFPA 13D Chapter 3

- Official NFPA Definitions:
  - Approved
  - Authority Having Jurisdiction
  - Shall
  - Should
  - Listed

# NFPA 13D Chapter 3

## Listed

Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose

# NFPA 13D Chapter 3

**Dwelling**

Any detached building, or any part of a townhouse structure which is separated from the remainder of the townhouse structure with fire resistance rated assembled in accordance with local building codes, that contains no more than two dwelling units intended to be used, rented, leased, let or hired out to be occupied or that are occupied for habitation purposes.

**Townhouse**

A one-family dwelling constructed in attached groups of three or more units in which each unit extends from the foundation to the roof and has open space on at least two sides. [5000, 2009]

# NFPA 13D Chapter 3

## Systems

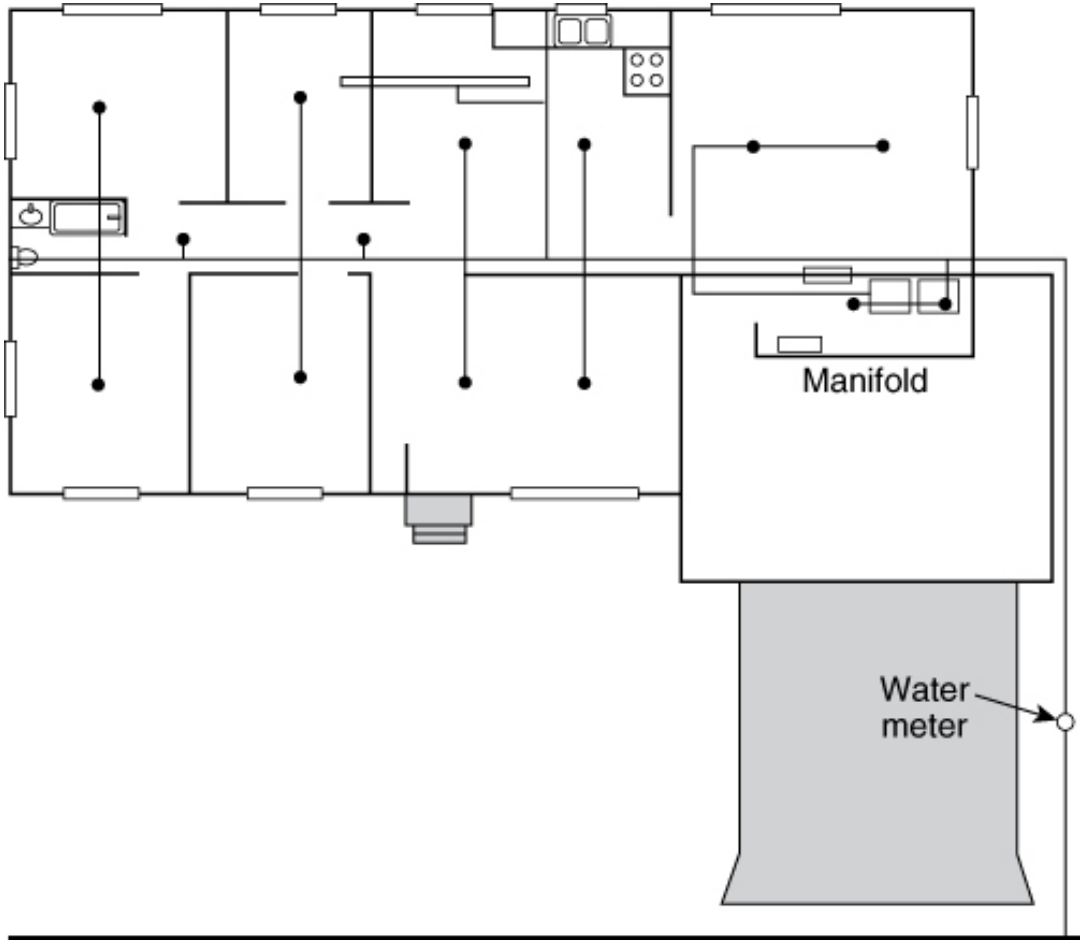
### Multipurpose Piping System

A piping system intended to serve both domestic and fire protection needs.

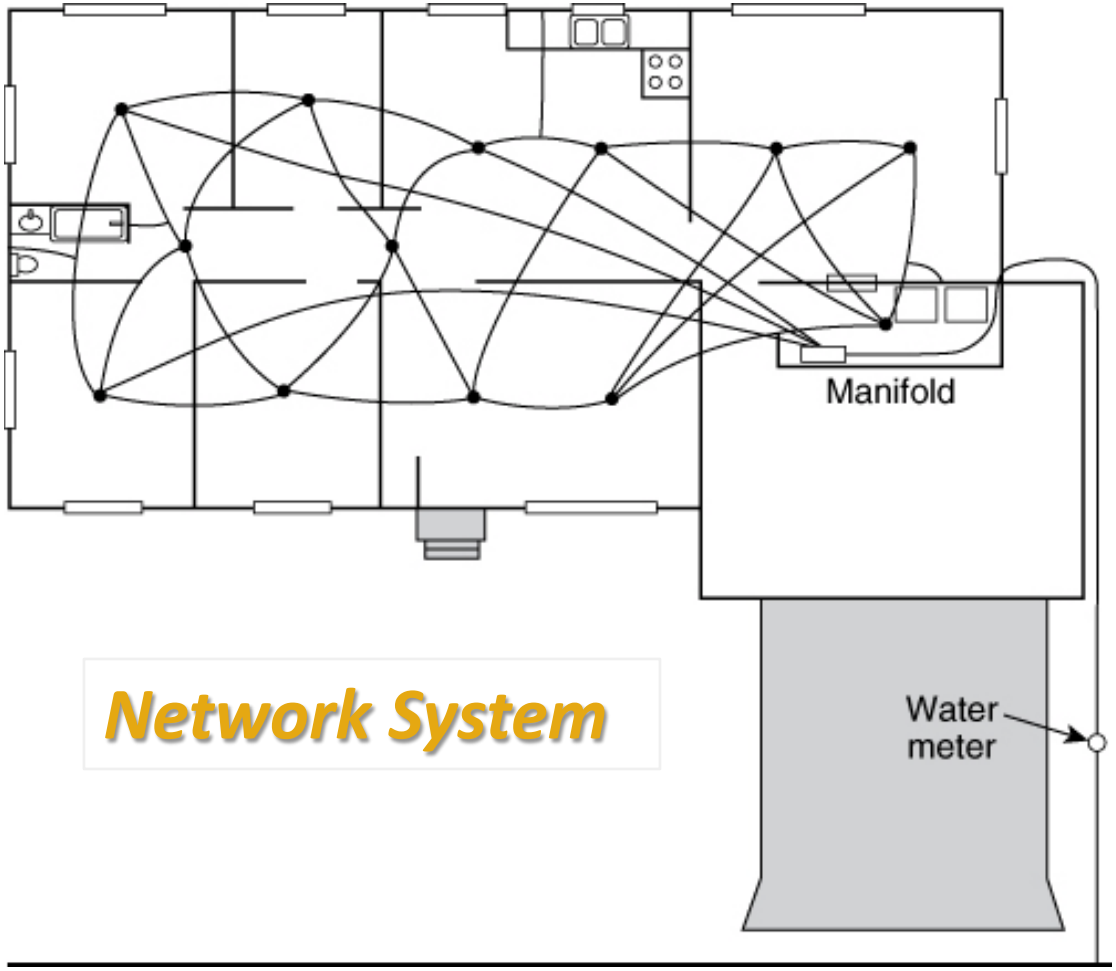
### Network System

A type of multipurpose system utilizing a common piping system supplying domestic fixtures & fire sprinklers where each sprinkler is supplied by a **minimum of three separate paths**.

# Multipurpose Piping System — Example 1



# Multipurpose Piping System — Example 2




**Network System**

# NFPA 13D Chapter 5 System Components

**General**

- Only new sprinklers shall be installed in sprinkler systems
- Devices and materials used in sprinkler systems shall be listed unless permitted not to be by 5.1.3
- Tanks, expansion tanks, pumps, hangers, waterflow detection devices, and waterflow valves **shall not be required to be listed**

# NFPA 13D Chapter 5 System Components

**Table 5.2.1.1 Pipe or Tube Materials and Dimensions**

Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use ASTM A 795

Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless ASTM A 53

Welded and Seamless Wrought Steel Pipe ANSI B 36.10M

Electric-Resistance-Welded Steel Pipe ASTM A 135

Seamless Copper Tube [Copper Tube (Drawn, Seamless) ASTM B 75

Seamless Copper Water Tube ASTM B 88

Wrought Seamless Copper and Copper-Alloy Tube ASTM B 251

Liquid and Paste Fluxes for Soldering Applications of Copper and Copper-Alloy Tube ASTM B 813

Filler Metals for Brazing and Braze Welding (BCuP, copper- phosphorus, or copper-phosphorus-silver brazing filler metal) AWS A5.8

# NFPA 13D Chapter 5 System Components

- Pipe used in sprinkler systems shall be designed to withstand a working pressure of not less than 175 psi (12.1 bar)

- Nonmetallic pipe used in multipurpose piping systems not equipped with a fire department connection shall be designed to withstand a working pressure of not less than 130 psi (8.9 bar) at 120°F (49°C).

- **Types of pipe other than those specified in Table 5.2.1.1 shall be permitted to be used where listed for sprinkler system use.**

# NFPA 13D Chapter 6 Water Supply

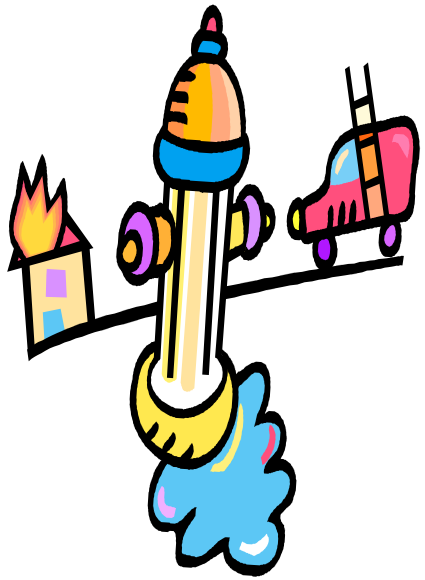
## General Provisions

- Every automatic sprinkler system requires at least one automatic water supply.
- Where stored water is used as the sole source of supply, the minimum quantity shall equal the water demand rate times 10 minutes unless permitted otherwise by 6.1.3
- Where stored water is used as the sole source of supply, the minimum quantity shall be permitted to equal the two-sprinkler water demand rate times 7 minutes where dwelling units meet the following criteria:
  (1) One story in height
  (2) Less than 2000 $ft^2$ (186 $m^2$) in area

# NFPA 13D Chapter 6 Water Supply

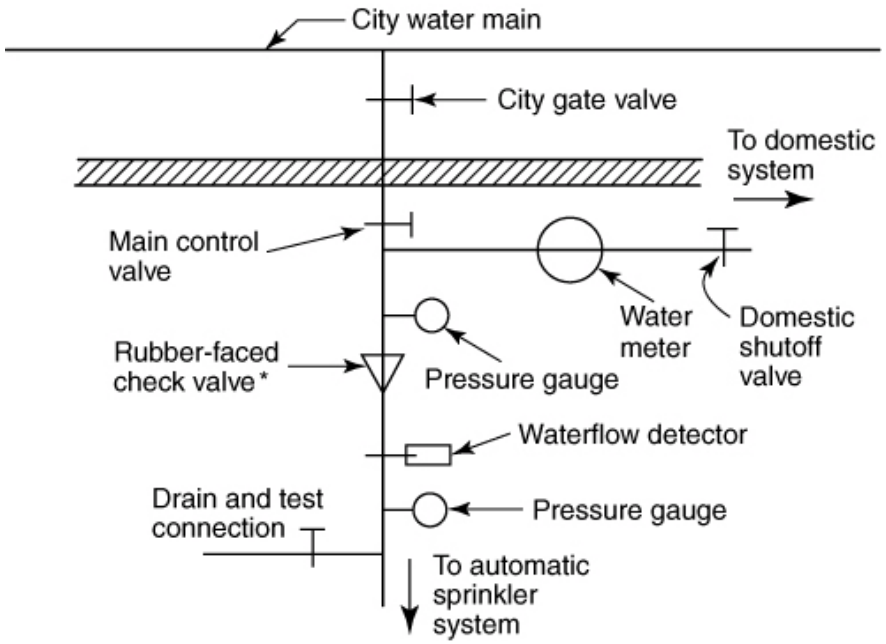
**Acceptable Sources:**

- Reliable Water Works
- Elevated Tank
- Pressure Tank
- Automatic Pump
- Well with a Pump



# NFPA 13D Chapter 6 Water Supply

## Preferred Arrangement




* Rubber-faced check valves are optional.

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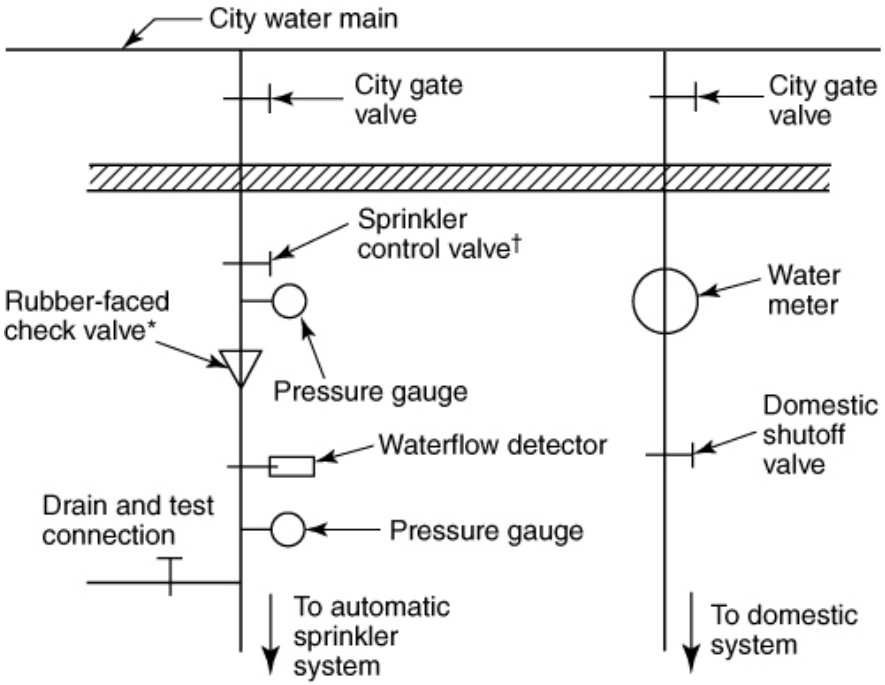
# NFPA 13D Chapter 6 Water Supply

## Acceptable Arrangement




* Rubber-faced check valves are optional.

† Optional valve: See 7.1.2.

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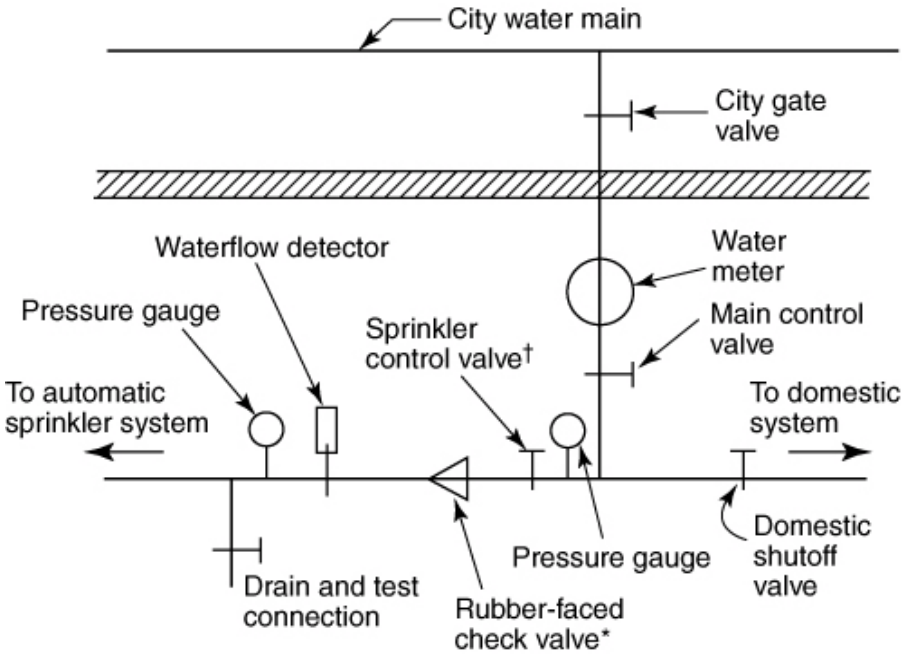
# NFPA 13D Chapter 6 Water Supply

## Acceptable Arrangement

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# NFPA 13D Chapter 6 Water Supply

## Multipurpose System

- **A piping system serving both sprinkler and domestic needs shall be considered to be acceptable by this standard where the following conditions are met:**

- (1) In common water supply connections serving more than one dwelling unit, 5 gpm (19 L/min) shall be added to the sprinkler system demand to determine the size of common piping and the size of the total water supply requirements where no provision is made to prevent flow into the domestic water system upon operation of a sprinkler.

- (2) All piping in the system supplying sprinklers is listed and conforms to the piping specifications of this standard.

# NFPA 13D Chapter 6 Water Supply

## Multipurpose System

- (3) Piping connected to the system that supplies only plumbing fixtures complies with local plumbing and health authority requirements but is not required to be listed.
- (4) Permitted by the local plumbing or health authority.
- (5) ***Warning Sign***. A sign shall be affixed adjacent to the main shutoff valve that states in minimum ¼ in. (6.4 mm) letters, "Warning, the water system for this home supplies fire sprinklers that require certain flows and pressures to fight a fire. Devices that restrict the flow or decrease the pressure or automatically shut off the water to the fire sprinkler system, such as water softeners, filtration systems, and automatic shutoff valves, shall not be added to this system without a review of the fire sprinkler system by a fire protection specialist. Do not remove this sign."

# NFPA 13D Chapter 7 Installation

## Piping Support

- Listed pipe shall be supported in accordance with any listing limitations.
- Pipe that is not listed, and listed pipe with listing limitations that do not include piping support requirements, shall be supported from structural members using support methods **comparable to those required by applicable local plumbing codes.**
- Piping laid on open joists or rafters shall be supported in a manner that prevents lateral movement.
- Sprinkler piping shall be supported in a manner that prevents the **movement of piping upon sprinkler operation**.

# NFPA 13D Chapter 7 Installation

## Sprinklers

- Sprinklers shall not be painted or enameled unless applied by the manufacturer and the sprinkler has been listed with such finishes.
- Where nonmetallic sprinkler ceiling plates (escutcheons) or recessed escutcheons (metallic or nonmetallic) are used, they shall be listed based on testing of the assembly as a residential sprinkler.
- **Where solvent cement is used as the pipe and fittings bonding agent, sprinklers shall not be installed in the fittings prior to the fittings being cemented in place.**

# NFPA 13D Chapter 7 Installation

## Sprinklers

- Listed residential sprinklers shall be used
  unless another type is permitted by 7.5.3 or 7.5.4.
- Residential sprinklers shall not be used on systems other than wet pipe systems unless specifically listed for use on that particular type of system.
- Listed standard dry-pendent or dry-sidewall sprinklers shall be permitted to be extended into unheated areas not intended for living purposes.
- Quick-response sprinklers shall be permitted to be used in mechanical closets.

# NFPA 13D Chapter 8 Design

**Sprinklers That Are Not Listed with Specific Discharge Criteria:**

- The system shall provide a discharge of **not less than 13 gpm** (49 L/min) per sprinkler simultaneously to all of the design sprinklers.

- The system shall provide a discharge of **not less than 18 gpm** (68 L/min) to any sprinkler in the system

# NFPA 13D Chapter 8 Design

- **Residential Sprinkler Installation Issues**
  - Area of Coverage
  - Deflector Distance
  - Obstructions
  - Ceiling Slope

# NFPA 13D Chapter 8 Design

Residential Sprinklers.

- Sprinklers shall be installed in accordance with their listing where the type of ceiling configuration is referenced in the listing.
- Where construction features or other special conditions exist that are outside the scope of sprinkler listings, **listed sprinklers shall be permitted to be installed beyond their listing limitations.**

# NFPA 13D Chapter 8 Design

**Minimum Pipe Size**

The minimum size of steel pipe shall be 1 in. (25.4 mm).

The minimum size of pipe other than steel pipe shall be ¾ in. (19 mm) unless smaller sizes are permitted by 8.4.3.3.

Along with listed special fittings, ½ in. (12.7 mm) nonmetallic pipe and ½ in. (12.7 mm) copper pipe shall be permitted to be used only in network systems and with certain conditions.

# NFPA 13D Chapter 8 Design

**Location of Sprinklers**

- Sprinklers shall be installed in **all areas except** where omission is permitted .
- Sprinklers shall not be required in bathrooms of 55 ft² (5.1 m² ) and less.
- Sprinklers shall not be required in clothes closets, linen closets, and pantries that meet all of the following conditions:
  1. The area of the space does not exceed 24 ft² (2.2 m² ).
  2. The least dimension does not exceed 3 ft (0.9 m).

# NFPA 13D Chapter 8 Design

**Location of Sprinklers**

- Sprinklers shall not be required in garages, open attached porches, carports, and similar structures.
- Sprinklers shall not be required in attics, penthouse equipment rooms, elevator machine rooms, concealed spaces dedicated exclusively to and containing only dwelling unit ventilation equipment, floor/ceiling spaces, elevator shafts, crawl spaces, and other concealed spaces that are not used or intended for living purposes and do not contain fuel-fired equipment.

# NFPA 13D Chapter 8 Design

**Location of Sprinklers**

- Sprinklers shall not be required in covered unheated projections of the building at entrances/exits as long as there is another means of egress from the dwelling unit.

- Requirements for ceiling pockets and skylights.

# Residential Fire Sprinkler Resources

**Resources:**

**Fire Smarts - www.firesmarts.com**

**www.ResidentialFireSprinklers.com**

**PHCC - www.phccweb.org**

**NFPA – www.nfpa.org**

**www.firesprinklerinitiative.org**

**Manufacturers:**

**Uponor - www.uponor-usa.com**

**Lubrizol - www.blazemaster.com**

**Viega - www.viega.net**

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